REMARKS

Entry of this Amendment After Final Rejection is respectfully requested. This Amendment does not raise any new issues or require any new searching by the Examiner. Furthermore, it is believed that upon entry of this Amendment, the application will be in condition for allowance. Accordingly, entry of this Amendment and reconsideration in light thereof is respectfully requested.

Claims 1-4, 12 and 13 are pending in the present application. Applicant has cancelled claims 5-11 without prejudice or disclaimer. Claim 1 has been amended. Support for the amendment to claim 1 is found in the specification on page 7, lines 8-10. New claims 12 and 13 have been added. Support for new claim 12 is found in the specification on page 7, lines 8-10. New claim 13 corresponds to and is supported by original claim 5 and the specification at page 7, lines 8-10 and page 8, lines 24-30. No new matter has been added.

I. Rejection under 35 U.S.C. § 112, First Paragraph

Claims 1-4 and 7-11 stand rejected under 35 U.S.C. § 112, first paragraph for allegedly failing to comply with the written description requirement. Applicant has obviated this rejection by amending claim 1 to delete the limitation "wherein the at least one multifunctional hydroxy compound is not a wax" and by canceling claims 7-11.

II. Rejections under 35 U.S.C. § 102 (e) and (b)

Claims 1-3, 7, 8 and 11 stand rejected under 35 U.S.C. § 102 (e) as being anticipated by Takami (U.S. Patent No. 6,166,101; hereinafter "the '101 patent"). Claims 1-3 and 7-11 stand rejected under 35 U.S.C. § 102 (b) as being anticipated by Takami et al. (U.S. Patent No. 5,721,020; hereinafter "the '020 patent"). Applicant respectfully traverses these rejections.

Claim 1 (as currently amended) is directed to a curable composition wherein the ratio of the oxetane compound to the polyfunctional cycloaliphatic epoxy compound to the

multifunctional hydroxy compound is from 7.5: 1.5: 1 to 150: 10: 1. Applicant submits that this ratio is not taught or disclosed in either the '101 or the '020 patent.

A. The Claimed Ratio

It is known that oxetanes tend to be less reactive than epoxies and cure relatively slowly under UV cationic conditions on their own. When oxetanes are mixed with cycloaliphatic epoxies, their cure speed is increased and is sometimes greater than that of the cycloaliphatic epoxy under the same conditions. It is also known that the UV cationic cure of cycloaliphatic epoxies is accelerated by the addition of alcohols. However, as shown in the present specification, the additional of alcohols to oxetanes drastically slows down the cure speed.

As shown in Example 9 of the present specification, the peak exotherm as a measure of the cure speed is greater when an oxetane is not mixed with an alcohol. Comp. 10a in Example 9 contains an oxetane compound and an epoxy compound but no alcohol. It has a cure speed of 16.9. Comps. 10b and 10d contain an oxetane compound and an alcohol and have a cure speed of 0.2 and 6.9, respectively. As shown, the combination of an oxetane and an alcohol alone drastically slows down the cure speed to the extent that a reaction is almost non-existent (comparison of Comp. 10a with Comps. 10b and 10d). (Specification at page 19, Example 9).

Applicant has surprisingly found that certain specific mixtures of polyfunctional cycloaliphatic epoxies, oxetanes and multifunctional hydroxy compounds are more reactive and have faster cure speeds even with low levels of UV cationic photoinitiators than formulations that do not contain oxetanes or that contain oxetanes and cycloaliphatic epoxies or multifunctional hydroxy compounds alone. (Specification at page 1, fourth full paragraph and page 7, third full paragraph). Example 9 shows that the peak exotherm as a measure of the cure speed is greater with the combination of oxetane, cycloaliphatic epoxy and polyol (Formulation

10) than with a combination of just two of the components alone (Comp. 10a, b, c and d). (Specification at page 19, Example 9).

1. The Claimed Ratio Expressed in Equivalents

In the claims, the ratio of the oxetane compound to the polyfunctional cycloaliphatic epoxy compound to the multifunctional hydroxy compound is expressed in terms of equivalents. Example 5 on page 15 of the specification describes a composition containing 85.5 grams of compound F (an oxetane compound), 9 grams of compound A (a polyfunctional cycloaliphatic epoxy compound) and 4 grams of CAPA 305 (a multifunctional hydroxy compound). The ratio of the oxetane compound to the epoxy compound to the hydroxy compound is 21.5: 2.9: 1. According to page 12 of the specification, compound F is 3,3- [1,4- phenylene-bis (methyleneoxymethylene)]-bis (3-ethyloxetane), compound A is 7-oxabicyclo [4.1.0]hept-3-ylmethyl ester-7-oxabicyclo [4.1.0] heptane-3-carboxylic acid and CAPA 305 is a polycaprolactone triol having a molecular weight of 540. Using the name and chemical formula of each component, the molecular weight ("Mw") and functionality of the component can be determined. Thus, compound F has a molecular weight of 357 and is a bifunctional oxetane. Compound A has a molecular weight of 268 and is a bifunctional epoxy. CAPA 305 has a molecular weight of 540 and is a tri-functional alcohol.

To determine the number of equivalents of reactive groups for each component in 1 gram of the composition, the amount of the component is multiplied by its functionality and then that number is divided by the component's molecular weight. For example, 85.5 grams of compound F is multiplied by 2 and then that number is divided by 357 to yield 0.47899 equivalents of oxetane groups per 1 gram of the composition. Similarly, 9 grams of compound A is multiplied by 2 and then that number is divided by 268 to yield 0.06716 equivalents of epoxy groups per 1

gram of the composition. Lastly, 4 grams of CAPA 305 is multiplied by 3 and then that number is divided by 540 to yield 0.0222 equivalents of hydroxy groups per 1 gram of the composition. The ratio of equivalents of oxetane groups to equivalents of epoxy groups to equivalents of hydroxy groups per 1 gram of the composition is thus 0.47899 to 0.06716 to 0.0222, which when divided by 0.0222 is 21.5 to 3 to 1 as stated in Example 5. Since this ratio falls within the ratio as recited in the claims, the ratio in the claims is expressed in terms of equivalents.

B. The '101 and '020 Patents

The '101 patent discloses an ultraviolet-curing coating composition comprising an alicyclic epoxy compound, an oxetane compound of a specific structure, an oxetane compound having a hydroxyl group, a compound having either two oxetane rings or an oxetane ring and epoxy group and a cation-polymerization initiator. The composition may further comprise a "fatty acid ester wax a" as shown in the Examples, which is a polyol compound and is present in an amount of 0.5 parts by weight. This fatty acid ester wax a is obtained by reacting 1 mole of decaglycerol ether (HO-(CH2-CH(OH)-CH2-O)n-H where n=10) with 10 moles of lauric acid (CH3-(CH2)10-COOH) to yield HO-(CH2-CH(OCO-(CH2)10-CH3)-CH2-O)10-H. (Col. 17, lines 55-59).

The '020 patent discloses an ultraviolet-curing coating composition comprising an epoxy compound, an oxetane compound, a cationic initiator and a lubricity-imparting agent. The lubricity-imparting agent may be a fatty acid ester wax such as fatty acid ester wax a similarly disclosed in the '101 patent, or fatty acid ester wax b, which is obtained by reacting 1 mole of hexaglycerine ether (HO-(CH2-CH(OH)-CH2-O)n-H where n=6) with 6 moles of lauric acid (CH3-(CH2)10-COOH) to yield HO-(CH2-CH(OCO-(CH2)10-CH3)-CH2-O)6-H. (Col. 15, Table 1, *4).

In the same manner as described above for Example 5 in the present specification, the molecular weight, functionality and equivalents of the components in Table 1 of the '101 patent and in Tables 1 and 4 of the '020 patent have been determined using their names and chemical formulas. The calculations are shown in Exhibits A and B respectively, attached hereto.

C. Analysis

In the presently claimed invention, Applicant has surprisingly found that the amount of polyol must be sufficient to act with the oxetane and cycloaliphatic epoxy to obtain the high curing speed. Therefore, the ratio of the cycloaliphatic epoxy to polyol is from 1.5: 1 to 10:1. In other words, there must be at least one alcohol functionality for 10 epoxy groups. Furthermore, Applicant has surprisingly found that there must be more oxetane groups than epoxy groups in the composition. Therefore, the ratio of the oxetane compound to the polyfunctional cycloaliphatic epoxy compound is between 7.5 : 1.5 and 150: 10. Compositions with more oxetane than epoxy have a higher peak exotherm and thus faster cure speed than compositions with more epoxy than oxetane.

It is clear from Exhibit A that the polyol content of all the examples in the '101 patent are far lower than the polyol content of the presently claimed invention and too low to provide any significant effect on the cure speed of the composition. Likewise, Exhibit B shows that most of the examples in the '020 patent have a polyol content that is too low to provide the high cure speed as in the presently claimed invention. Although Examples 4, 5 and 12 have a higher amount of polyol in the composition than the other examples, Examples 4, 5 and 12 have more epoxy than oxetane.

Accordingly, it is clear from Exhibits A and B that the Examples taught in the '101 and '020 patents do not fall within the ratio as claimed in the present invention. Since the '101 and

the '020 patents fail to teach each and every element of independent claim 1 of the present invention, the '101 and the '020 patents cannot anticipate independent claim 1 or those claims dependent therefrom. Applicant respectfully requests that the rejections be withdrawn.

CONCLUSION

Applicant believes that the present application is now in condition for allowance. Favorable consideration of the application as amended is respectfully requested.

The Commissioner is authorized to charge any fees, or credit any overpayments, as a result of this paper to Deposit Account No. 16-2500.

Respectfully submitted,

Proskauer Rose LLP

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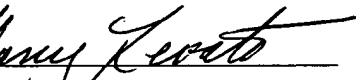
By 
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The '101 Patent

TABLE 1

			Examples								Comparative Examples				
			1	2	3	4	5	6	7	8	1	2	3	4	5
Component	Mw	functionality	weight %												
A1cycloaliphatic epoxy	252.39	2	40	40	30	40	20	60	25	40	60	60	60	92	5
A2cycloaliphatic epoxy C20H30O6	366.57	2	0	0	0	0	20	0							
B1 oxetane	200.39	1	20	0	20	20	20	5	20	20					
B2 oxetane;C10H20O3	188.33	1	0	20	0	0	0	0				20	20	4	20
C1 oxetane	116.16	1	20	20	0	20	20	25	5	20	20		20	4	30
C2 oxetane	246.43	1	0	0	30			0							
D1 oxetane	332.56	2	20	20	20	0	20	10	50	20	20	20			45
D2 oxetane (epoxy) C9H16O3	172.28	1	0			20	0	0							
fatty acid ester wax a C150H282O31 (bifunctional)	2583.00	2	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
equiv g oxetane			0.3923	0.3987	0.3418	0.3881	0.3923	0.3003	0.4435	0.3923	0.2925	0.2265	0.2784	0.0557	0.6351
equiv g epoxy			0.3170	0.3170	0.2377	0.4331	0.2676	0.4755	0.1981	0.3170	0.4755	0.4755	0.4755	0.7290	0.0396
equiv g polyol			0.0004	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
which corresponds to;															
equiv g oxetane			1013	383	328	373	377	289	426	377	281	218	267	53	610
equiv g epoxy			819	305	228	416	257	457	190	305	457	457	457	700	38
equiv g polyol			1	1	1	1	1	1	1	1	1	1	1	1	1

The '020 Patent

TABLE 1

			Examples						Comparative Examples		
			1	2	3	4	5	6	1	2	3
Component	Mw	functionality	weight %								
A1 cycloaliphatic epoxy	252.39	2	60	30	60	80	80	50	60	60	80
Formula 17; cycloaliphatic epoxy C20H30O6	366.57	2	20	20	20				20	20	
Epikote; not cycloaliphatic epoxy			20								
C6H12O2 hydroxymethyloxetane	116.16	1	20	50	20			20			
Allyloxy... oxetane C9H16O2	156.28	1	0			20					
Oxetane formula 16 C12H22O3	214.38	2	0				20				
Tone 0305	540.00	3	0			10	10				10
Fatty acid ester wax a	2583.00	2	1	1	1			1	1	1	
Fatty acid ester wax b (bifunctional) C(15*)H(28*6+2)O3*6+1	1557.00	2				1	1				1
equiv g oxetane			0.1722	0.4304	0.1722	0.1280	0.1866	0.1722	0.0000	0.0000	0.0000
equiv g epoxy			0.5846	0.3468	0.5846	0.6339	0.6339	0.3962	0.5846	0.5846	0.6339
equiv g polyol			0.0008	0.0008	0.0008	0.0568	0.0568	0.0008	0.0008	0.0008	0.0568
which corresponds to:											
equiv g oxetane			222	556	222	2	3	222	0	0	0
equiv g epoxy			755	448	755	11	11	512	755	755	11
equiv g polyol			1	1	1	1	1	1	1	1	1

The '020 Patent

TABLE 4

			Examples								Comparative Example
			7	8	9	10	11	12	13	14	5
Component	Mw	functionality	weight %								
A1 cycloaliphatic epoxy	252.39	2	50	50	30	30	70	70	50	50	90
A2 monoepoxy: it is not a multifunctional epoxy	0	1	0	10	10	10					10
B1=C6H12O2 hydroxymethyloxetane	116.16	1	20	20	5	5	25	25	20	20	
B2=C12H22O3 oxetane	214.38	2	10						10	10	
B4 oxetane	158.25	1	0		55	55	5	5			
B3 oxetane	322.56	2	20	20					20	20	
Fatty acid ester wax a	2583.00	2	1	1	1	1	1	1	1	1	1
Tone 0305	540.00	3	0	0	10	10	0	10			10
equiv g oxetane			0.3895	0.2962	0.3906	0.3906	0.2468	0.2468	0.3895	0.3895	0.0000
equiv g epoxy			0.3962	0.3962	0.2377	0.2377	0.5547	0.5547	0.3962	0.3962	0.7132
equiv g polyol			0.0008	0.0008	0.0563	0.0563	0.0008	0.0563	0.0008	0.0008	0.0563
which corresponds to:											
equiv g oxetane			503	383	7	7	319	4	503	503	0
equiv g epoxy			512	512	4	4	716	10	512	512	13
equiv g polyol			1	1	1	1	1	1	1	1	1